COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

SUBJECT: Waste Guidance Memorandum No. 01-2008
Water Guidance Memorandum No. 08-2002

Surface Water Impacts at Solid Waste Landfills

TO: Regional Directors

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EXECUTIVE SUMMARY

The Department of Environmental Quality's ("Department") Waste and Water Programs both have the authority to resolve regulatory violations caused by unpermitted landfill-derived discharges to surface water or groundwater. This guidance defines the goals for addressing unpermitted discharges to surface water caused by releases from solid waste landfills. Most commonly, landfill-derived surface water impact mitigation will proceed as part of site wide groundwater corrective action under the oversight of the Department's Waste Program. When such groundwater remedial actions would also require a Virginia Pollution Discharge Elimination System (VPDES) permit for a surface water discharge, the permit should be issued with conditions which satisfy the applicable requirements of both the Water and Waste Programs. This guidance establishes that VPDES permits should not be issued to discharges of contaminated groundwater in cases where the discharge is not related to some form of active remediation/treatment, otherwise part of groundwater corrective action.

Electronic copy:
An electronic copy of this document is available for staff internally on the DEQnet, and for the public on DEQ's website at http://www.deq.virginia.gov/waterguidance/permits.html.

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Disclaimer:
This document is provided as guidance and, as such, sets forth standard operating procedures for the agency. It does not mandate any particular method nor does it prohibit any particular method for the analysis of data, establishment of a Waste load allocation, or establishment of a permit limit. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations.

LIMITATIONS

This guidance applies to all solid waste landfill sites which have surface water impacts resulting from *unpermitted* discharges including landfills which are lined, unlined, active, closed, permitted, unpermitted, or those declared open dumps. This guidance does not apply to hazardous waste landfills or any other landfill otherwise exempt from groundwater monitoring requirements under **9 VAC 20-80-10** et. seq.

Surface water impacts recognized as a result of storm water management issues shall be addressed under existing Water Program policy and permitting guidance. This guidance does not cover cases where the surface water impact results from non-compliance with an *existing*, landfill-issued VPDES permit. Mitigation of the surface water impairment in such instances shall proceed as allowed under existing Water permitting guidance and policy. However, on a case-by-case basis permitting staff may choose to adopt permit conditions contained in this guidance to address impairments recognized at previously VPDES permitted landfills.

This guidance augments existing **Water guidance 00-2010** which addresses how to handle unpermitted discharges. Undertaking any actions under this guidance to mitigate a surface water impact using the Solid Waste Management Regulations (**9 VAC 20-80-10**) shall not supersede, restrict or replace any of the Water Program's permitting or compliance authorities.

This guidance uses the surface water definitions of "permanent", "intermittent", and "ephemeral" as used in **Water Guidance 91-002**. This guidance also uses the existing definitions of surface water related 'compliance' points for the purposes of dealing with impacted groundwater during the groundwater corrective action process.

The definition of "leachate" used in this guidance is consistent with that found in **40 CFR 257 & 258,** EPA's **Glossary of Terms** (1997), and **9 VAC 20-80-10**.

The use of the term "discharge" to surface water as it appears in this Guidance is consistent with **9 VAC 25-31-10**.

For internal purposes only, the definition of the term "free" in **9 VAC 25-260-20,** is herein understood to mean constituent levels which are below the laboratory limit of detection (LOD). The LOD represents the lowest concentration of a constituent which can be recognized by the analytical test as being present with 99% chance of certainty. Although LOD levels may be below that which can be assigned a numerical value, constituents detected are considered to be physically present in the sample with a 99% certainty. Because this definition does not take into account potential background concentrations otherwise naturally present in the surface water, interpretation of sampling results should not be used as the sole basis for any determination of non-compliance with regulatory requirements under **9 VAC 25-260-20**.

This guidance does not define the process to follow in addressing potential non-compliance with any aspect of the Water and/or Waste Regulations, but instead defers to the procedures already established in the Department's 1999 Enforcement Manual.

PURPOSE

This guidance satisfies **Va. Code 10.1 – 1425.19,** which requires intra-program coordination during multimedia inspections and with **Va. Code 10.1 – 1402(9),** which requires that the Waste Board coordinate with other government entities in order to achieve maximum effectiveness while imposing the least burden of duplicate regulatory requirements. Most importantly, this guidance clarifies the response of the Waste and Water Programs to landfill-related, unpermitted discharges and their impacts to surface waters.

A discussion of the authority upon which this guidance is based is presented in **Appendix A**. In general, this guidance is based on the requirements of both the Waste and Water Programs found under **9 VAC 20-80-10** et seq., **9 VAC 25-31-10** et seq., and **9 VAC 25-260-05** et seq. This guidance sets forth the following four policy goals regarding surface water:

- **LIMIT CROSS-MEDIA CONTAMINANT TRANSFER**
  Consistent with existing EPA Corrective Action guidance (**EPA/530/R-01/015**), Federal solid waste disposal facility criteria under **40 CFR 258.27** and preamble language to **40 CFR 257 (44 FR 53438 – 53468)**, cross media transfer of landfill-derived contaminants from groundwater to surface water should not take place unless such transfer is governed by a discharge permit. Any such permit issued should contain discharge limitations which satisfy applicable conditions of both the Water and Waste Programs.

- **CONSISTENT USE OF GROUNDWATER PROTECTION STANDARDS**
  Consistent with **9 VAC 20-80-10**, leachate impacted groundwater is regulated as contaminated groundwater, and remediation of contaminated groundwater must achieve site-specific groundwater protection standards (GPS) established under **9 VAC 20-80-300** before Corrective Action can be considered complete under **9 VAC 20-80-310**. Surface water quality standards under **9 VAC 25-260-5** et seq., do not supersede or negate the requirement to meet the standards of groundwater remediation required under the Solid Waste Regulations.

- **UTILIZE COORDINATION IN VPDES PERMIT CONDITION DEVELOPMENT**
  VPDES permits should not be issued to a landfill owner/operator for a discharge of leachate-impacted groundwater unless the discharge is related to remediation/treatment of the impacted groundwater. If a VPDES permit is issued, it should contain those conditions required by the Water regulations, as well as those conditions which may be considered necessary by the Regional Waste Program Manager to address operational or post-closure provisions in the Virginia Solid Waste Management Regulations or which may be required as part of groundwater Corrective Action.

- **UTILIZE THE SURFACE WATER GENERAL STANDARD**
  No proposed groundwater Corrective Action Plan should include a remedy (or presumptive remedy) which would contribute to surface water conditions that would conflict with any provision found under the General Standard of **9 VAC 25-260-20** which requires all State waters be free from waste substances in concentrations or combinations which contravene established standards or which are inimical or harmful to human, animal, plant, or aquatic life, or which nourish undesirable or nuisance aquatic plant life.

MAKING THE CASE FOR SURFACE WATER IMPACT

If possible, any suspected case of landfill-related surface water impact should be verified through one or more of the following methods:

- Photographic or video evidence of impact obtained during the site inspection (examples given in **Appendix D**).

- Analysis of surface water samples (acquired by either Department staff, or representatives of the Permittee) collected in a manner consistent with applicable U.S. Geological Survey, EPA, or other accepted environmental protocols.

- Results of a benthic macroinvertebrate survey, with results compared to a similar survey undertaken at an unimpacted reference section (preferably onsite).

ADDRESSING SURFACE WATER IMPACTS AT LANDFILLS

Detailed examples of how to best address surface water impacts recognized at solid waste landfills are presented in **Appendix B & C**. In general, should evidence of surface water impact be observed during the field inspection, or brought to the attention of the Department in response to a complaint, the solid waste inspector should determine whether either of the two following scenarios applies to the site:

- Does the landfill already have a VPDES Permitted discharge which appears to be the cause of the impact? If so, then mitigation of the surface water impairment in such instances shall proceed as allowed under existing Water permitting guidance and policy, and the matter simply has to be referred from the Waste Program to the appropriate contact in the Water Program for action. The Water program shall keep the Waste Program informed of the measures (if any) required by the Permittee to address the noted impact.

- If no VPDES permit has been issued to the landfill, has the landfill exceeded any of its groundwater protection standards and/or is the landfill monitoring in the groundwater Corrective Action Program? If so, the impairment may be addressed in a manner consistent with the groundwater remediation plan under development or via amendment to the implemented remediation plan. If needed, the inspector may contact the Regional Groundwater Remediation Specialist to determine if site groundwater monitoring data suggests a contaminant plume is discharging to, or migrating to surface water.

If neither of these scenarios apply to the impact, the impact should be first addressed under the applicable authority of the VSWMR under the landfill *operational* (**20-80-250.C; 260.C; 270.C**) or *closure* (**20-80-250.E; 260.E; 270.E**) provisions. If the VSWMR does not provide the authority to completely mitigate a point source discharge, a VPDES permit may be issued to the discharge and its impacts. In such cases, the Permit shall not contain conditions which are in conflict with VSWMR (including groundwater protection standards) or limit the enforcement authority of the Waste Program to address violations of the VSWMR which may be causing or contributing to the surfacewater impairment.

CONCLUSIONS

Provisions under VSWMR, the State Water Control Law, the Virginia Water Quality Standards, and the VPDES and VPA Regulations give the Department the authority to address landfill-derived surface water impacts. Staff should use whatever regulatory tools are available to address landfill-derived surface water impacts in a manner that is consistent with the following four guiding principles:

- **LIMIT CROSS-MEDIA CONTAMINANT TRANSFER**
- **CONSISTENCY IN APPLICATION OF GROUNDWATER PROTECTION STANDARDS**
- **COORDINATION IN VPDES PERMIT CONDITION DEVELOPMENT**
- **CONSISTENCY IN APPLICATION OF THE SURFACE WATER GENERAL STANDARD**

REFERENCES

US EPA, 1997, Terms of Environment – Glossary, Abbreviations, and Acronyms. Office of Communications, Education, and Public Affairs. **EPA/175/B-97/001.**

US EPA, 2001, Handbook of Groundwater Protection and Clean-up Policies for RCRA Corrective Action. Office of Solid Waste and Emergency Response. **EPA/530/R-01/015.**

Virginia DEQ, 1991, Use of Water Quality Standards in the VPDES Permit Program. Office of Water Resource Management. **Water Guidance memorandum 91-002.**

Virginia DEQ, 1999, Enforcement Manual, 167p.

Virginia DEQ, 2000, Protocol for DEQ Action in the Event Unpermitted Discharges are Identified. Division of Water Program Coordination. **Water Guidance memorandum 00-2010.**

Virginia DEQ, 2000, Guidance on Preparing VPDES Permit Limits. **Water Guidance memorandum 00-2011.**

APPENDIX A

HISTORICAL BACKGROUND

The Department administers and implements the Waste Management Act and State Water Control Law, each of which contains provisions regulating the discharge of leachate or other pollutants into state waters. The responsibility of addressing landfill-derived surface water impacts was ceded to the Department of Waste Management by the Water Control Board in 1988. The 1988 Water Control Board guidance noted that:

> *"The State Water Control Board will provide assistance as requested to the Department of Waste Management"*,[and] *"The Department of Waste Management will have exhausted all other possible remedies before deferring the matter to the Water Control Board for issuance of a Permit".*

Concerning unpermitted discharges, more recent guidance **(Water Guidance 00-2010)**, established that:

> *"Upon identification and documentation of an unpermitted discharge, the facility owner or operator must be formally notified. In cases where environmental harm has occurred or the discharge is a repeat violation, initial notification may be in the form of a Notice of Violation."*
>
> *"The notification should inform the facility owner or operator ... that action needs to be taken to bring the facility into compliance".*

This guidance establishes that whenever possible, the mitigation of the surface water impacts at landfills should proceed under the landfill *operational* **(20-80-250.C; 260.C; 270.C)**, *closure* **(20-80-250.E; 260.E; 270.E)**, or *corrective action* **(9 VAC 20-80-310)** provisions of the VSWMR. Even though mitigative actions for surface water impacts may proceed under the authority of the VSWMR, close coordination with the Water Program is required to remain consistent with provision/policies in existing Water Program guidance, ensure the development of robust enforcement cases, as well as ensuring full protection of human health and the environment.

AUTHORITY & RESPONSIBILITY

Title 62.1 – 44.5 of the State Water Law prohibits the discharge or other quality alterations of state waters except as authorized by Permit. Virginia's Water and Solid Waste Management regulations also contain a number of restrictions regarding surface water quality which may be applicable at landfill sites including: **9 VAC 25-260-20**, which requires all State waters be free from waste substances in concentrations or combinations which contravene established standards or which are inimical or harmful to human, animal, plant, or aquatic life, or which nourish undesirable or nuisance aquatic plant life; **9 VAC 25-260-140**, which requires that in-stream water quality not be acutely or chronically toxic except as allowed in mixing zones; **9 VAC 25-31-50**, which prohibits discharge into State Waters or the alteration of the physical, chemical or biological properties of State Waters making them detrimental to public health, animal, or aquatic life, unless in compliance with a VPDES Permit; and, **9 VAC 25-32-30**, which prohibits the discharge into State Waters or the alteration of the physical, chemical or biological properties of State Waters making them detrimental to public health, animal or aquatic life, unless in compliance with a VPA Permit.

Surface water quality provisions for *operating* sanitary landfills may be found under **9 VAC 20-80-250.C** which prohibits: solid waste from being deposited in, or being permitted to enter any surface water or groundwater (**C.10**); any violations of the Clean Water Act, VPDES permit, or Virginia Water Quality Standards (**C.12.a**); and non-point source discharges in violation of an area-wide or state-wide water quality management plan approved under section 208 or 319 of the Clean Water Act, or Virginia Water Quality Standards (**C.12.b**).

Surface water quality provisions for *operating* non-sanitary landfills may be found under **9 VAC 20-80-260.C.14** and **9 VAC 20-80-270.C.19** which prohibit the draining or discharge of leachate into surface waters except as authorized by a VPDES Permit.

Provisions for *closed* landfills may be found under **9 VAC 20-80-250.E.1.a; 9 VAC 20-80-260.E.1.a**; and **9 VAC 20-80-270.E.1.a**; each require a landfill to be closed in a manner that controls, minimizes, or eliminates, … the post-closure escape of uncontrolled leachate, surface runoff, or waste decomposition products to … surface water.

Provisions for *unpermitted* landfills may be found under **9 VAC 20-80-180.B.3** which prohibits an unpermitted landfill from causing a discharge into State Waters in violation of VPDES or VPA requirements.

CONSISTENCY WITH EPA

When issuing the Federal Solid Waste Disposal regulations, EPA noted that:

> "*It is essential that solid waste activities not adversely affect the quality of the nation's surface water*" [**44 FR 53443** (1979)]; [**56 FR 51054** (1991)].

Concerning potential impacts from groundwater plumes, EPA noted that:

> "*Non-point source pollution from solid waste disposal activities must not be in violation of legal requirements established to implement a water quality management plan under Section 208 (or section 319) of the Clean Water Act*" [**44 FR 53444** (1979)]; [**56 FR 51054** (1991)].

When dealing with groundwater remediation at solid waste management sites, EPA noted that:

> "… *(Subtitle D) rule allows an approved State to determine that remediation of a release of an appendix II constituent is not necessary in situations where the MSWLF is located over an aquifer that is not currently or reasonably expected to be a source of drinking water, and that is not interconnected with (surface) waters to which the hazardous constituents are migrating, or likely to migrate in a concentration(s) that would exceed the groundwater protection standards*" [**56 FR 50996** (1991)].

In other words, EPA did not rely on separate surface water quality criteria values as a remediation end point. Instead EPA set GPS as the benchmark regarding surface water impacts, and required groundwater to be remediated if it was known to be, or reasonably expected to be discharging

into surface water at levels which would otherwise exceed GPS levels. The language found in this Guidance is consistent with EPA's position on solid waste related impacts to surface water.

RECOGNITION OF SURFACE WATER IMPACTS AT LANDFILLS

It in not the intent of this guidance to require solid waste inspectors to make definitive decisions regarding surface water impacts at landfills during site inspections. Rather, this guidance only establishes a responsibility on the part of the inspector for recognizing conditions which *may* indicate a surface water impairment on site. The following site conditions should be considered:

- Are surface water bodies present within or along the permitted solid waste facility boundary?
- Is the surface water feature permanent, intermittent or ephemeral in nature?
- Is there visual evidence of potential landfill-derived surface water impact such as:

  1) evidence of blowing trash or excessive sedimentation from failure to manage stormwater runoff,
  2) presence of abnormal or unusual growth of bacterial mats coating the channel bottom and sides [commonly orange, grey, or black in color; and bulbous, spongy, or filamentous in form],
  3) dead aquatic life, or
  4) odors or coloration which might suggest chemical discharge.

APPENDIX B

MITIGATING NON-POINT SOURCE SURFACE WATER IMPACTS

Additionally, where landfill-derived surface water impacts are documented, the Waste Program shall ensure that the groundwater Corrective Action include a remedy (or Presumptive Remedy) which can be shown to have the ability to meet the requirements of both **9 VAC 20-80-310.B** as well as the General Standard surface water provisions of **9 VAC 25-260-20.**

Non-Point Source Impacts
Landfills not in groundwater Corrective Action:

Where surface water impacts result from non-point source discharge related to non-compliance with *operational* or *closure* requirements of the VSWMR without the landfill being in groundwater corrective action; impact mitigation will proceed under the direction of the Regional Waste Program Manager via allowable solid waste enforcement mechanisms or an amendment to the existing solid waste permit. The Regional Biologist may be asked for assistance (macroinvertebrate survey) in cases where the allowable Waste Program enforcement mechanisms fail to adequately address the surface water impacts.

Non-Point Source Impacts
Landfills already in groundwater Corrective Action:

For those landfills already in groundwater corrective action, per **9 VAC 20-80-310.B.2,** a remediation plan that achieves the groundwater protection standards and is protective of human health and the environment (including surface water) will be required. In any case where landfill-derived surface water impacts are documented, groundwater Corrective Action must include a remedy (or Presumptive Remedy) which can be shown to have the ability to meet the requirements of both **9 VAC 20-80-310.B** and **9 VAC 25-260-20,** even in those cases where the impaired surface water body may already be impacted by other non-landfill sources. Allowing additional landfill-derived impacts to surface water may counteract mitigative actions required under the TMDL Program.

To measure the effectiveness of the remedy selected, a surface water monitoring component may be required (under the authority of **9 VAC 20-80-490** and **9 VAC 20-80-310.B.2**) as part of corrective action and may include: sampling, macro-invertebrate monitoring and, water quality assessments performed in accordance with Virginia Stream Condition Index protocols.

APPENDIX C

MITIGATING POINT SOURCE SURFACE WATER IMPACTS

Unpermitted Point Source Impacts
Landfills not in groundwater Corrective Action:

In cases where the surface water impact results from an existing unpermitted point source discharge of underdrain, leachate collection, groundwater dewatering actions, or seep/spring collection systems at a landfill that shows no evidence of groundwater impact and is not in the Solid Waste Corrective Action Program, the Permittee may apply to permit the discharge through the VPDES Program. If a VPDES permit is issued, it should contain those conditions required by the Water regulations, as well as those conditions which may be considered necessary by the Regional Waste Program Manager to address operational or post-closure provisions in the Virginia Solid Waste Management Regulations.

Unpermitted Point Source Impacts
Landfills already in groundwater Corrective Action:

In cases where the surface water impacts result from an existing unpermitted point source discharge, or a new proposed point source discharge related to underdrain, leachate collection, groundwater dewatering actions, or seep/spring collection at a landfill which is already in the Corrective Action Program, the Permittee may still apply to permit the discharge through the VPDES Program but any VPDES permit for a landfill facility within known groundwater impacts should be designed to include the Solid Waste Corrective Action Monitoring special condition described separately below.

Permitted Point Source Impacts
Landfills not in groundwater Corrective Action:

This guidance does not cover cases where the surface water impact results from non-compliance with an *existing*, landfill-issued VPDES permit. Mitigation of the surface water impairment in such instances shall proceed as allowed under existing Water permitting guidance and policy. However, on a case-by-case basis permitting staff may choose to adopt permit conditions contained in this guidance to address impairments recognized at previously VPDES permitted landfills. Mitigative action oversight from the Waste Program would only occur if the surface water impacts could be tied back to non-compliance with any of the *operational* or *closure* requirements of the VSWMR.

Permitted Point Source Impacts
Landfills in groundwater Corrective Action [with active remediation systems]:

When, as part of the Solid Waste Corrective Action Program, the landfill owner/operator proposes to install a ground water remediation system which would include a new point source discharge, a VPDES permit will be required. If use of the remediation system could include instream impacts such as constructed wetlands, then a VWP permit may also be required. Any VPDES or VWP related activities should follow the individual requirements of those programs in addition to any remedial objectives of the facility's Corrective Action Plan.

Two key considerations must be kept in mind regarding the issuance of VPDES permits in situations resulting from the extraction and treatment of contaminated groundwater. Because

both Water and Waste regulations may be applicable, the VPDES application and draft permit shall be forwarded to the Regional Waste Program Manager and Groundwater Program Coordinator for review and comment prior to permit issuance to ensure the permit does not contain conditions or allowances which would conflict or otherwise restrict the ability of the Waste Program to enforce the *closure* or *corrective action* provisions of the Waste Regulations. These review coordination actions should be undertaken in a timeframe which does not otherwise negatively impact VPDES permit processing.

For the purposes of determining where the point source derived impacts to water quality standards (WQS) criteria apply, Water Program staff should follow the procedures established in **Water Guidance Memorandum 00-2011.** WQS apply to:

- all perennial streams and any intermittent streams originating outside (off of) the landfill Permittee's property.

- the downstream property line for any ephemeral streams or intermittent streams that originate on the Permittee's property. Please note, as discussed in **Guidance Memorandum 00-2011**, it is not the intent to suggest or recommend that owners may avoid the proper application of the WQS by purchasing the entire watershed of an intermittent stream.

VPDES permits issued under this guidance for the discharge of contaminated groundwater associated with landfills should include:

1. Treatment of any contaminated groundwater prior to discharge
2. Acute or chronic Whole Effluent Toxicity (WET) limits, depending on the discharge duration).
3. Parameter-specific effluent limitations for any constituent for which monitoring results indicate a potential to exceed a Virginia water quality criterion (see GM00-2011)..
4. In-stream macroinvertebrate monitoring and water quality assessments performed in accordance with the Virginia Stream Condition Index to document any impacts of the discharge/remediation system on the receiving stream (see example below).
5. For facilities in Corrective Action, end-of-pipe monitoring necessary to prove attainment of groundwater clean-up standards consistent with completion of groundwater corrective action under **9 VAC 20-80-310** (see example below).

Example Special Condition and Fact Sheet Language:

- Qualitative Benthic Macroinvertebrate Study Special Condition

  Annual benthic macroinvertebrate studies shall be performed on the receiving stream to assess impacts of the discharge and shall be conducted between mid-August and October. The first benthic study shall be conducted within one year following the effective date of the permit during the designated months. The study protocol shall use *A Stream Condition Index for Virginia Non-Coastal Streams*, Tetra Tech, Inc., September, 2003. The study protocol, including sampling locations, survey methods, data analysis, etc. shall be submitted to and approved by DEQ Water Division staff prior to initiation of testing. The benthic reports shall be due February 10th of each year with an additional copy supplied to the Regional Waste Program Manager.

- Qualitative Benthic Macroinvertebrate Study Fact Sheet Language

Rationale: This condition requires annual benthic macroinvertebrate instream studies to determine if the corrective actions taken are protective of the instream benthic population. In accordance with **9 VAC 25-31-220.D.1.b**, instream studies may be used to characterize the reasonable potential for the discharge to cause or contribute to an instream excursion above a narrative or numeric criteria within a Virginia water quality standard.

- Solid Waste Corrective Action Monitoring Special Condition

A] The Permittee shall monitor the discharge for the below-listed solid waste groundwater constituents found under Table 5.1 of **9 VAC 20-80-300.D**. Monitoring of these constituents shall take place quarterly and shall be compared to the site-specific groundwater protection standards (Solid Waste remediation goals) developed under **9 VAC 20-80-300.B or C**. These results shall be used as a means to evaluate the effectiveness of the remediation system implemented under **9 VAC 20-80-310.C.1** to achieve the groundwater protection standard, as well as to help in determining when the Permittee has achieved the remediation goals established under **9 VAC 20-80-310.C**.

B] The monitoring of these solid waste constituents shall have no bearing on the determination of compliance or non-compliance with the effluent limitations expressed elsewhere in this Permit.

C] The monitoring results shall be submitted to the Regional Waste Program Manager at the following address _____ by April 10th, July10th, October 10th and January 10th of each year, with an additional copy issued to the Groundwater Program Coordinator in Richmond.

D] Solid Waste constituents which shall be monitored include the following as identified in Module XIV of the facility's Solid Waste Permit:

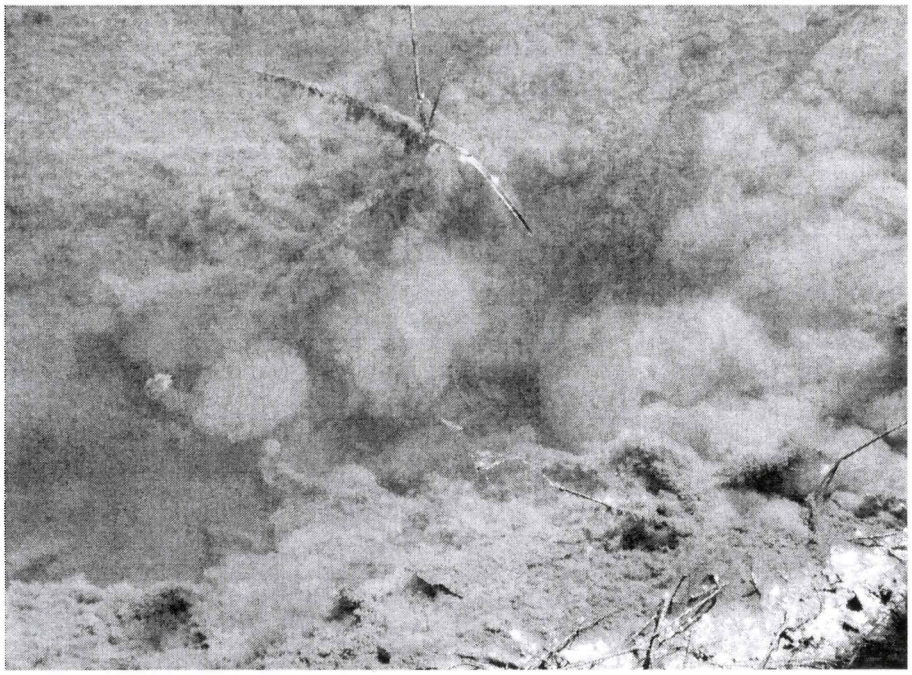
Constituent Name [__] – Ground water Protection Standard set as xx ppb
Constituent Name [__] – Ground water Protection Standard set as xx ppb
Constituent Name [__] – Ground water Protection Standard set as xx ppb

- Solid Waste Corrective Action Monitoring Fact Sheet Language

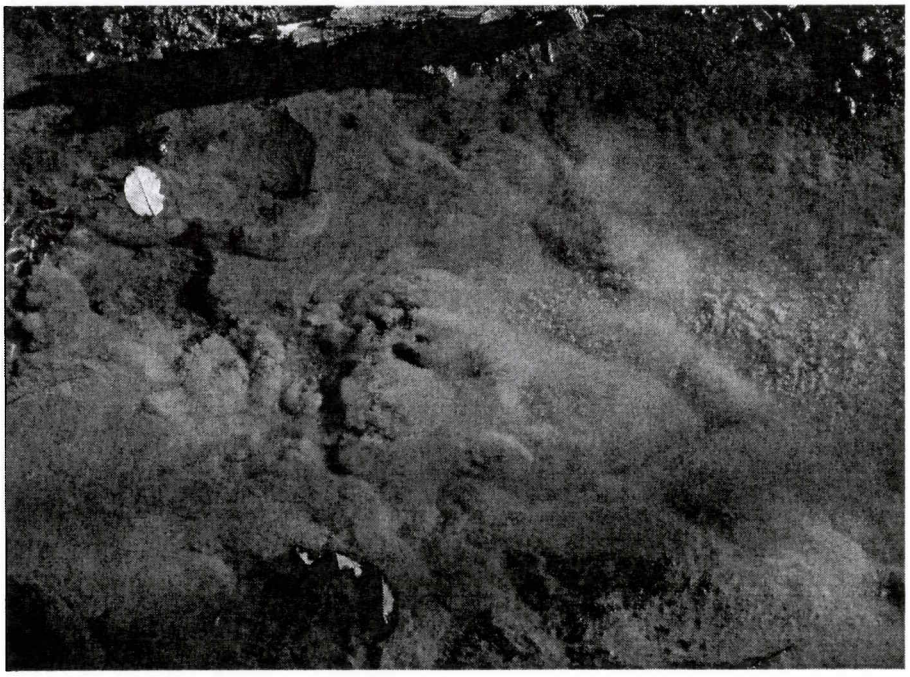
Rationale: This condition requires quarterly monitoring for landfill-derived constituents identified in the facility's Corrective Action Plan as ones which exceed site specific groundwater protection standards. Consistent with the requirements of **9 VAC 20-80-310.B.2 and C.5.b**, the Permittee must sample for the included constituents as a means of measuring the success of the implemented groundwater remedy as well as to determine when sampling actions under Corrective Action may terminate.

APPENDIX D

Two examples of impact from groundwater plumes discharging into the base of streams with bedrock channel bottoms.



Two examples of impact from groundwater plumes discharging into the base of streams with channel bottoms of unconsolidated sediment.



Impact from groundwater plume discharging at a spring head.

Impact from leachate impacted surface water diverted beneath an unlined waste mass and issuing from a pipe outlet.